IN THE CLAIMS:

Please amend claims 7, 15 and 19 as follows.

1. (Previously Presented) A cable modem termination system, said system comprising:

a media access controller;

at least one physical layer transceiver in connection with said media access controller for receiving and transmitting data;

a CPU interface configured to communicate with a CPU; and

a network functions module in communication with said media access controller and said CPU interface, wherein the network functions module comprising an upstream flow module for providing quality of service for upstream packet flows, a bridging and routing module for performing bridging of packets to a downstream flow module and for routing the packets to and from a bus and the downstream flow module for providing quality of service for incoming packet flows and for wrapping outgoing packets, the downstream flow module comprising a rule module,

wherein said network functions module is configured to conduct flow management and classification functions upon packets traveling through said media access controller.

2. (Previously Presented) A system as recited in claim 1, wherein said network functions module is further configured to conduct at least one of traffic policing, rate shaping, and scheduling.

3. (Original) A system as recited in claim 1, wherein said network functions module is further configured to both classify the packets traveling through said media access controller as well as conduct traffic policing and rate shaping upon the packets traveling through the media access controller.

4. (Original) A system as recited in claim 1, wherein said network functions module is further configured to conduct quality of service functions.

5. (Original) A system as recited in claim 4, wherein said network functions module is further configured to conduct quality of service functions compatible with predetermined specifications.

6. (Original) A system as recited in claim 5, wherein said predetermined specifications further comprise DOCSIS specifications.

7. (Currently Amended) A system as recited in claim 1, wherein said network functions module further comprises:

the upstream flow module in connection with said bridging and routing module[[,]];

the downstream flow module in connection with said bridging and routing module;

a memory in communication with said upstream flow module, said down stream flow module, and said bridging and routing module; and

a content addressable memory module in communication with said bridging and routing module.

8. (Original) A system as recited in claim 7, wherein said network functions module further comprises:

at least one PCI bus interconnecting said bridging and routing module to other modules;

at least one network interface for communicating with external networks;

at least one link in communication with at least one of said upstream flow module and said down stream flow module for transmitting and receiving packets from other systems.

9. (Original) A system as recited in claim 7, wherein said upstream flow module further comprises:

a memory management module;

an incoming quality of service module in communication with the memory management module; and

a bin module in communication with the memory management module, wherein the incoming quality of service module and the bin module are configured to cooperatively implement a modified scalable leaky bucket algorithm to support a quality of service function.

10. (Original) A system as recited in claim 9, wherein said upstream flow module further comprises:

a packet parser module in communication with said memory management module;

a command module; and

an output queue module in communication with said command module and said memory management module.

11. (Original) A system as recited in claim 7, wherein said bridging and routing module is configured to determine a cable modem identification and store said cable modem identification in said content addressable memory module.

12. (Original) A system as recited in claim 11, wherein said bridging and routing module further comprises:

a bridging memory management module;

a network interface module in communication with a network interface and the bridging memory management module;

a content addressable memory interface module in communication with said content addressable memory, said bridging memory management module, and said network interface module;

a PCI interface module in communication with a PCI bus interface, said content addressable memory, said bridging memory management module, and said network interface module; and

a command interface module in communication with said PCI interface module, content addressable memory interface, said bridging memory management module, and said network interface module.

13. (Original) A system as recited in claim 12, wherein said bridging memory management module and said content addressable memory module are configured to cooperatively operate to reduce a number of DOCSIS rules to be searched through determining a cable modem identification.

14. (Original) A system as recited in claim 7, wherein said upstream flow module further comprises:

at least one scalable fair leaky bucket architecture for shaping packets;

a priority encoder in communication with each of the at least one scalable fair leaky bucket architectures for prioritizing packets; and

a final output queue in communication with said priority encoder for transmitting prioritized packets.

15. (Currently Amended) A system as recited in claim 14, wherein each of said at least one scalable fair leaky bucket architecture further comprises:

a packet processing module for receiving and managing packet flow;

at least one per flow queue in communication with the packet processing module;

at least one sorting bin in communication with said packet processing module and said at least one per flow queue; and

an output queue in communication with said packet processing module.

16. (Original) A system as recited in claim 7, wherein said downstream flow module further comprises:

a memory management module;

a command module in communication with said memory management module;

a rule module in communication with said memory management module;

an incoming QOS module in communication with said memory management module;

a bin module in communication with said memory management module;

an output queue module in communication with said memory management module; and

a packet wrapping module in communication with said memory management module.

17. (Original) A system as recited in claim 16, wherein said rule module further comprises an interface, wherein said interface is configured to communicate with a rule memory.

18. (Original) A system as recited in claim 16, wherein said memory management module further comprises a memory interface, wherein said memory interface is configured to communicate with a memory.

19. (Currently Amended) A network functions module, said network functions module comprising:

at least one flow module;

at least one memory in communication with said at least one flow module;

a bridging and routing module in communication with said at least one flow module and said at least one memory, the bridging and routing module performs bridging of packets to a downstream flow module and routes the packets to and from a bus,

wherein said bridging and routing module comprises at least memory means for receiving a packet pointer for a packet selected from one of a plurality of sources,

wherein said network functions module is configured to implement flow control and quality of service functions on packets in a network.

20. (Previously Presented) A network functions module as recited in claim 19, wherein said at least one flow module further comprises:

an upstream flow module in communication with said bridging and routing module and said at least one memory; and

the downstream flow module in communication with said upstream flow module, said bridging and routing module, and said at least one memory,

wherein said upstream flow module is configured to receive packets and said downstream flow module is configured to transmit packets.

21. (Original) A network functions module as recited in claim 19, wherein said at least one flow module further comprises a scalable architecture for packet shaping, said scalable architecture comprising:

a packet processing module for receiving packets;

a communication link in connection with said packet processing module;

at least one per flow queue in communication with said communication link;

at least one sorting bin in communication with said communication link;

an output queue in communication with said communication link; and

a token recovery module in communication with said packet processing module and said output queue.

22. (Original) A network functions module as recited in claim 21, said network functions module further comprising:

a plurality of said scalable architectures for packet shaping;

a priority encoder in communication with the output queue of each of said plurality of scalable architectures for packet shaping; and

a final output queue in communication with said priority encoder,

wherein each of said plurality of said scalable architectures for packet shaping is configured to receive incoming packets and conduct quality of service functions on the incoming packets before transmitting the incoming packets to the priority encoder.

23. (Original) A network functions module as recited in claim 21, wherein said at least one sorting bin further comprises a plurality of individual sorting bins, wherein each of said individual sorting bins corresponds to a different class of flow.

24. (Original) A network functions module as recited in claim 23, wherein said at least one sorting bin further comprises:

a timer module in communication with said packet processing module; and

a scheduled bin in communication with said packet processing module, wherein said scheduled bin is configured to reduce jitter caused by said scalable architecture for packet shaping.

25. (Original) A network functions module as recited in claim 22, wherein said priority encoder is configured to generate a priority for the packets traveling through the network functions module.

26. (Original) A network functions module as recited in claim 20, wherein said downstream flow module further comprises:

a memory management module;

a command module in communication with said memory management module;

a rule module in communication with said memory management module;

an incoming QOS module in communication with said memory management module;

a bin module in communication with said memory management module;

an output queue module in communication with said memory management module; and

a packet wrapping module in communication with said memory management module.

27. (Original) A system as recited in claim 26, wherein said rule module further comprises an interface, wherein said interface is configured to communicate with a rule memory.

28. (Original) A system as recited in claim 26, wherein said memory management module further comprises a memory interface, wherein said memory interface is configured to communicate with a memory.

29. (Previously Presented) A method for processing, said method comprising the steps of:

receiving a packet in a media access controller;

transmitting the packet to a network functions module;

providing quality of service for upstream packet flows in an upstream flow module;

performing bridging of the packet to a downstream flow module and routing the packet to and from a bus in a bridging and routing module;

implementing flow management and classification functions on the packet;

wrapping an outgoing packet in a downstream flow module; and

forwarding the packet to an appropriate destination.

30. (Original) A method for processing as recited in claim 29, wherein said step of implementing flow management functions further comprises the step of implementing at least one of traffic policing, rate shaping, and scheduling.

31. (Original) A method for processing as recited in claim 29, wherein said step of implementing flow management functions further comprises implementing a modified leaky bucket implementation.

32. (Original) A method for processing as recited in claim 31, wherein said step of implementing a modified leaky bucket implementation further comprises the steps of:

receiving incoming packets in at least one scalable fair leaky bucket configuration;

transmitting an output of each of the at least one scalable fair leaky bucket configurations to a priority encoder for prioritization; and

receiving prioritized packets at a final output queue.

33. (Original) A method for processing as recited in claim 32, wherein said step of receiving incoming packets in at least one scalable fair leaky bucket configuration further comprises:

receiving an individual incoming packet in a packet processing module of an individual scalable fair leaky bucket configuration;

transmitting the individual packet to at least one of a plurality of per flow queues and a plurality of sorting bins for packet shaping in accordance with a predetermined algorithm; and

transmitting a shaped packet to an individual output queue.

34. (Original) A method for processing as recited in claim 33, wherein said method further comprises the step of providing a token recovery module for tracking packet flow through the plurality of per flow queues and the plurality of sorting bins.

35. (Original) A method for processing as recited in claim 33, wherein said step of transmitting the individual packet to at least one of a plurality of per flow queues and a plurality of sorting bins further comprises the steps of using the plurality of per flow queues to queue packets for rate shaping and using the plurality of sorting bins to delay packet flow in accordance with a predetermined algorithm.

36. (Original) A method for processing as recited in claim 29, wherein said step of forwarding the packets to appropriate destinations further comprises the steps of:

receiving a packet pointer;

determining a cable modem identification;

generating a pointer to forwarding rules;

comparing the pointer to the forwarding rules in order to determine a match;

extracting predetermined parameters from the match; and

forwarding the packet in accordance with the predetermined parameters extracted.

37. (Original) A method for processing packets as recited in claim 36, wherein the predetermined parameters are a payload header suppression index and a service flow identification.

38. (Original) A method for processing packets as recited in claim 29, wherein said implementing step further comprises the steps of:

determining a cable modem identification;

storing the cable modem identification in a content addressable memory; and

retrieving predetermined rules corresponding to the packet in accordance with the cable modem identification.

39. (Original) A method for processing packets as recited in claim 38, wherein said storing step further comprises attaching the cable modem identification to at least one address associated with the cable modem identification.